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ANNOTATED LIST OF FISHES OBTAINED BY THE
CALIFORNIA ACADEMY OF SCIENCES DURING
SIX CRUISES OF THE U. S. S. *MULBERRY*
CONDUCTED BY THE UNITED
STATES NAVY OFF CENTRAL
CALIFORNIA IN 1949
AND 1950

BY

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On August 19, 1949, the California Academy of Sciences and the United States Navy executed a contract (No. N9 onr 94400 of the Office of Naval Research) which provided for the joint participation of the two institutions in a series of explorations of the waters adjacent to the coastline of central California.

Before the outbreak of the war in Korea terminated the operations, seven members of the Academy's staff had participated in one or more of a total of six cruises, all of which were made aboard the U. S. S. *Mulberry*, a Diesel-electric, twin-screw auxiliary net-layer 151 feet 9 $\frac{5}{8}$ inches in length, Lieutenant James B. Birteh, U. S. N., commanding. The staff members so participating were Robert C. Miller, director; G Dallas Hanna, curator of paleontology; Joseph R. Slevin, curator of herpetology; W. I. Follett, curator of ichthyology; Earl S. Herald, curator of aquatic biology; Robert P. Dempster, aquatic biologist; and Delbert G. Goodwin, assistant in paleontology.

This paper deals with all the fishes obtained during the six cruises. The habitats explored were those from the surface, through intermediate stages, to the sea-bottom in depths of 4.5 to 1100 fathoms, and at offshore distances of 0.7 to 46.6 miles, all within 60 miles of San Francisco.

The fishes taken include shallow-water forms as well as those ranging from the pelagic zone to the sea-bottom at considerable depths. In addition to commoner species of the region, there are some relatively rare forms such as the first recorded embryo and egg-stage of *Raja trachura*, several specimens of *Cyclothone pallida*, and one specimen each of *Tactostoma macropus*, *Myctophum californiense*, and *Nectoliparis pelagicus*. Three extensions of range are represented: a southerly extension (and first recorded occurrence from California waters) for *Neoscopelarchoides dentatus*, and northerly extensions for *Isurus glaucus* and *Sebastes serranoides*. Two noteworthy extensions of habitat are indicated in the taking far at sea of postlarvae of *Hypomesus pretiosus*, a species that spawns upon sandy beaches, and of *Hemilepidotus spinosus*, which in its juvenile and adult stages inhabits the intertidal and relatively high subtidal zones of rocky shores. The offshore habitat of *Hexagrammos decagrammus* is indicated by the taking of a number of young exhibiting modifications for a pelagic existence. The young stages of five species are illustrated.

NOMENCLATURE

The nomenclature of this paper is that employed by Hubbs and Follett (MS.). Following their precedent, the attributive of the vernacular name is enclosed in parentheses where another species known by the same vernacular occurs only beyond the boundaries of California. Where, on the other hand, more than one form occurring within California is known by the same vernacular, parentheses are omitted from the attributive of each.

Except as otherwise indicated, the original citations required by Declaration 7 of the International Commission on Zoological Nomenclature (1943: 51) may be found in Jordan and Evermann (1896, 1898a, 1898b) or in Jordan, Evermann, and Clark (1930).

ACKNOWLEDGMENTS

For extensive assistance, particularly with the more difficult determinations, I am greatly indebted to Carl L. Hubbs, of the University of California. Elbert H. Ahlstrom, of the U. S. Fish and Wildlife Service, identified the specimens of *Chauliodus macouni* and *Neoscopelarchoides dentatus*. Earl S. Herald and Donald A. Simpson, of the Academy's Department of Aquatic Biology, assisted with the *Sebastes* gill-raker counts.

ABBREVIATIONS AND DEFINITIONS

In addition to certain conventional abbreviations, those designated below are employed in this paper. Some brief indications of methods used are appended.

- A*, anal fin rays, counted as by Hubbs and Lagler (1947:8-10).
AOa, anal organ, anterior series, as defined by Bolin (1939b:91).
AOp, anal organ, posterior series, as defined by Bolin (1939b:91).
BR, branchiostegal rays.
CAS, California Academy of Sciences (Department of Ichthyology), followed by the catalog number.
C, principal caudal fin rays, counted as by Hubbs and Lagler (1947:8-10).
D, dorsal fin rays, counted as by Hubbs and Lagler (1947:8-10).
GRa, gill-rakers of the anterior row on the first arch, counted as by Hubbs and Lagler (1947:13).
GRp, gill-rakers of the posterior row on the first arch. These are usually much shorter than those of the anterior row, and are sometimes knob-like.
off., away from, in a seaward direction.
*P*₁, pectoral fin rays, counted as by Hubbs (1945:130).
*P*₂, pelvic (ventral) fin rays, counted as by Hubbs and Lagler (1947:8-10).
Pol, posterolateral organ, as defined by Bolin (1939b:91).
postlarva, as defined by Hubbs (1943:260).
Pre, precaudal organ, as defined by Bolin (1939:91).
SAO, supra-anal organ, as defined by Bolin (1939b:91).
scales, counted as by Hubbs and Lagler (1947:11-12).
SL, standard length (straight line from tip of snout to caudal base), as used by Hubbs and Lagler (1947:13-14).
T, true north.
temperature, of surface water.
time of day, expressed as on a 24-hour chronometer, and invariably indicating Pacific Standard Time (e. g., 0700 = 7 A. M.; 1900 = 7 P. M.).
TL, total length (straight line from most anterior projecting part of head to farthest tip of caudal fin when caudal rays are squeezed together), as used by Hubbs and Lagler (1947:13).
VO, ventral organ, as defined by Bolin (1939b:91).

LOCALITY DATA

FIRST CRUISE: *August 22-26, 1949*, G Dallas Hanna, Joseph R. Slevin, and Earl S. Herald participating:

Field No. F49-12D: Cordell Bank, E. side; Ship's log, "Sta. 2"; 38°00'00" N., 123°22'24" W.; 16.6 miles off Pt. Reyes; August 23; time, 1015-1035; on bottom; depth of water, 57 to 50 fathoms; temperature, 11.1° C. (52° F.); dredge, cylindrical, diameter 18 inches, length 6 feet.

Field No. F49-12E: Cordell Bank; Ship's log, "Sta. 3"; 37°59'42" N., 123°25'12" W.; 18.8 miles off Pt. Reyes; August 23; time, 1200-1500; on bottom; depth of water, 34 fathoms; temperature, 11.1° C. (52° F.); hook and line, squid and clam bait.

Field No. F49-12F: Cordell Bank, W. side; Ship's log, "Sta. 5"; 38°00'45" N., 123°26'30" W.; 19.7 miles off Pt. Reyes; August 23; time,

1645-1800; on bottom; depth of water, 35 fathoms; temperature, 11.1° C. (52° F.); hook and line.

Field No. F49-12FF, identical with F49-12F except as follows: Time, 1900-2200; at surface; night light and dip-net.

Field No. F49-12G: Cordell Bank, NW. side; Ship's log, "Sta. 7"; 38°03'18" N., 123°31'12" W.; 23.7 miles off Pt. Reyes; August 24; time, 1330-1345; on bottom (?); depth of water, 124 to 90 fathoms; dredge, cylindrical.

Field No. F49-12H: Cordell Bank; Ship's log, "Sta. 9"; 38°02'00" N., 123°24'48" W.; 18.6 miles off Pt. Reyes; August 24; time, 1635-1830; on bottom: depth of water, 28 fathoms: hook and line.

Field No. F49-12III, identical with F49-12H except as follows: Time, 1800; at surface; night light and dip-net.

Field No. F49-12I: Cordell Bank; Ship's log, "Sta. 10"; 38°02'12" N., 123°24'48" W.; 18.6 miles off Pt. Reyes; August 25; time, 0800-0810; on bottom; depth of water, 34 fathoms; dredge, cylindrical.

Field No. F49-12J: North Farallon Island vicinity (1.1 miles E., 1.0 mile N.); Ship's log, "Sta. 13"; 37°47'00" N., 123°04'36" W.; 13.0 miles off Pt. Reyes; August 25; time, 1530-1900; on bottom; depth of water, 42 fathoms; hook and line.

Field No. F49-12JJ, identical with F49-12J except as follows: Time, 1900-2100; at surface; night light and dip-net.

SECOND CRUISE: *September 26-29, 1949*, Robert C. Miller, G Dallas Hanna, W. I. Follett, and Robert P. Dempster participating:

Field No. F49-13: Cordell Bank; Ship's log, "Sta. 15"; 38°00'30" N., 123°25'15" W.; 18.8 miles off Pt. Reyes; September 26; time, 1930-2200; at surface to ca. 2 feet; depth of water, 34 fathoms; temperature, 14.4° C. (58° F.) at 2000; dip-net (49 fish); trap, 3-foot eubical screen with electric light in top, side-entrances submerged ca. 2 feet (1 fish).

Field No. F49-14, identical with F49-13 except as follows: September 27; time, 0600-0730; on bottom; temperature, 13.3° C. (56° F.) at 0700; hook and line, squid bait.

Field No. F49-15: Cordell Bank; Ship's log, "Sta. 17"; 38°02'30" N., 123°26'30" W.; 19.9 miles off Pt. Reyes; September 27; time, 1930-2300; at surface; depth of water, 40 fathoms; temperature, 14.4° C. (58° F.) at 1900; trap (as in F49-13), side-entrances at water level.

Field No. F49-16, identical with F49-15 except as follows: September 28; time, 0600-0730; on bottom; temperature, 15.8° C. (60.5° F.) at 0700; hook and line, squid bait.

Field No. F49-17: Cordell Bank vicinity (4.4 miles S., 1.2 miles E.); Ship's log, "Sta. 19"; 37°55'15" N., 123°24'05" W.; 18.4 miles off Pt. Reyes; September 28; time, 1624-1700; on bottom; depth of water, 68 fathoms; temperature, 14.4° C. (58° F.) at 1700; dredge, rectangular, 3.5x1x5 feet.

Field No. F49-18: Cordell Bank vicinity (5.0 miles E., 3.9 miles S.); Ship's log, "Sta. 20"; 37°55'45" N., 123°19'15" W.; 14.6 miles off Pt. Reyes; September 28; time, 1715-1755; on bottom; depth of water, 62 fathoms; temperature, 14.4° C. (58° F.) at 1800; dredge, rectangular, 3.5x1x5 feet.

Field F49-19: Cordell Bank; Ship's log, "Sta. 21"; 38°00'15" N., 123°26'00" W.; 19.4 miles off Pt. Reyes; September 29; time, 0600-0700; on bottom; depth of water, 28 fathoms; temperature, 15.5° C. (60° F.) at 0700; hook and line, squid bait.

Field No. F49-20: Fanny Shoal vicinity (8.1 miles W.); Ship's log, "Sta. 22"; 37°48'40" N., 123°23'00" W.; 20.3 miles off Pt. Reyes; September 29; time, 0843-1000; on bottom; depth of water, ca. 400 fathoms; temperature, 13.9° C. (57° F.) at 1000; dredge, rectangular, 3.5x1x5 feet.

THIRD CRUISE: *February 6-9, 1950*, G Dallas Hanna and Earl S. Herald participating:

Field No. F50-A1: "Mulberry Seamount," 22.7 miles W. and 15.4 miles S. of Southeast Farallon Island; Ship's log, "Sta. 32"; 37°26'30" N., 123°28'42" W.; 46.6 miles off Pt. Montara; February 8; time, 1700-1815; on bottom; depth of water, 1000 to 700 fathoms; dredge, cylindrical, diameter 15 inches.

FOURTH CRUISE: *February 13-17, 1950*, G Dallas Hanna participating:

Field No. F50-1A: Guide Seamount (NW. flank), 47.4 miles W. and 4.5 miles S. of Año Nuevo Island; Ship's log, "Sta. 43"; 37°02'00" N., 123°20'00" W.; 45.7 miles off Pigeon Point; February 14; time, 1649-1825; depth of capture, unknown; depth of water, 980 fathoms; temperature, 11.7° C. (53° F.); tow-net, diameter 45 inches, mesh ¼-inch; 40-pound weight attached; 300 fathoms of ⅜-inch wire out.

Field No. F50-1AA, identical with F50-1A except as follows: Time, ca. 1900; at surface; dip-net.

Field No. F50-1B: Off Waddell Creek (= "Big Gulch") mouth (30.5 miles W.); Ship's log, "Sta. 46"; 37°05'30" N., 122°55'00" W.; 25.5 miles off Pigeon Point; February 15; time, 1850-2040; depth of capture, unknown; depth of water, 420 fathoms; temperature, 10.6° C. (51° F.); tow-net, diameter 45 inches, mesh ¼-inch; 300 fathoms of ⅜-inch wire out.

Field No. F50-1BB, identical with F50-1B except as follows: Time, ca. 2100; at surface; dip-net.

FIFTH CRUISE: *March 27-31, 1950*, Robert C. Miller, G Dallas Hanna, W. I. Follett, and Delbert G. Goodwin participating:

Field No. F50-A7: Southeast Farallon Island vicinity (3.1 miles W., 1.8 miles S.); Ship's log, "Sta. 54"; 37°40'12" N., 123°03'50" W.; 26.2 miles off Pt. San Pedro; March 27; depth of capture, unknown; depth of water, 44 to 33 fathoms; dredge, cylindrical, diameter 20 inches, length 67 inches.

Field No. F50-7: Drakes Bay; Ship's log, "Sta. 55"; 38°00'20" N., 122°57'06" W.; 1.1 miles offshore; March 28; time, 1130-1830; on bottom; depth of water, 4.5 fathoms; temperature, 9.4° C. (49° F.) at 1810; hook and line, squid bait.

Field No. F50-7A, identical with F50-7 except as follows: Time, 1945-2400; at surface; night light and dip-net.

Field No. F50-8: Cordell Bank vicinity (5.3 miles W., 1.7 miles N.); Ship's log, "Sta. 56"; 38°03'50" N., 123°33'30" W.; 25.7 miles off Pt. Reyes; March 29; time, 1230; on bottom; depth of water, 400 to 200 fathoms; dredge, cylindrical, diameter 20 inches, length 67 inches.

Field No. F50-9, identical with F50-8 except as follows: Ship's log, "Sta. 57"; time, 1340-1405; depth of capture, unknown; depth of water, 400 fathoms; tow-net, diameter 45 inches, length 12 feet, mesh 1/2-inch; 400 fathoms wire out.

Field No. F50-10: Cordell Bank vicinity (5.5 miles W.); Ship's log, "Sta. 58"; 38°00'30" N., 123°33'00" W.; 25.0 miles off Pt. Reyes; March 29; time, 1448-1530; depth of capture, unknown; depth of water, 600 fathoms; tow-net, diameter 45 inches, length 12 feet, mesh 1/2-inch; 550 fathoms wire out, to net.

Field No. F50-11: Cordell Bank vicinity (0.7 mile S.); Ship's log, "Sta. 59"; 37°59'10" N., 123°25'15" W.; 18.8 miles off Pt. Reyes; March 29; time, 1745-2145; on bottom; depth of water, 30 fathoms; temperature, 10.3° C. (50.5° F.) at 2210; hook and line, squid bait.

Field No. F50-12, identical with F50-11 except as follows: March 30; time, 0545-0800; temperature, 10.3° C. (50.5° F.) at 0900.

Field No. F50-13: Cordell Bank vicinity (5.2 miles S., 1.9 miles W.); Ship's log, "Sta. 60"; 37°54'30" N., 123°28'00" W.; 21.6 miles off Pt. Reyes; March 30; time, 0930-1040; depth of capture, unknown; depth of water, 400 to 500 fathoms; tow-net, diameter 45 inches, length 12 feet, mesh 1/2-inch; 450 fathoms wire out, to net.

Field No. F50-14: Cordell Bank vicinity (8.7 miles S.); Ship's log, "Sta. 61"; 37°51'00" N., 123°26'00" W.; 21.2 miles off Pt. Reyes; March 30; time, 1105-1240; depth of capture, unknown; depth of water, 425 fathoms; tow-net, diameter 45 inches, length 12 feet, mesh 1/2-inch; 580 fathoms wire out, to net.

Field No. F50-A15: Fanny Shoal vicinity (8.3 miles W., 5.9 miles S.); Ship's log, "Sta. 62"; 37°42'30" N., 123°23'00" W.; 24.2 miles off Pt. Reyes; March 30; time, ca. 1200 to ca. 1700; on bottom; depth of water, 1000 fathoms; dredge, cylindrical, at end of 2400 fathoms of wire.

Field No. F50-15, identical with F50-A15 except as follows: Time, 1310-1625; depth of capture, unknown; tow-net, diameter 45 inches, length 12 feet, mesh 1/2-inch; 1500 fathoms wire out, to net.

Field No. F50-16, identical with F50-A15 except as follows: Time, 1325-1542; depth of capture, unknown; tow-net, diameter 45 inches, length 10 feet, mesh 1/4-inch; 900 fathoms wire out, to net.

Field No. F50-17: North Farallon Island vicinity (ca. 0.2 mile E.); Ship's log, "Sta. 63"; 37°46'15" N., 123°06'00" W.; 13.9 miles off Pt. Reyes; March 30; time, 1845-2200; on bottom; depth of water, 25 fathoms; temperature, 10.6° C. (51° F.); at 2215; hook and line, squid bait.

Field No. F50-18, identical with F50-17 except as follows: March 31; time, 0517-0715; temperature, 10.6° C. (51° F.) at 0725.

SIXTH CRUISE: April 6-7, 1950, Robert C. Miller, G Dallas Hanna, and W. I. Follett participating:

Field No. F50-19: Southeast Farallon Island vicinity (11.9 miles W., 9.0 miles S.); towed thence 5.5 miles, 240° T.; Ship's log, "Sta. 64"; 37°33'00" N., 123°15'00" W.; 34.8 miles off Pt. Montara; April 6; time, 1258-1523; depth of capture, unknown; depth of water, 1100 fathoms; tow-net, diameter 45 inches, length 12 feet, mesh 1/2-inch; 1200 fathoms wire out, to net.

Field No. F50-20, identical with F50-19 except as follows: Time, 1245-1555; tow-net, diameter 45 inches, length 10 feet, mesh 1/2-inch; 1800 fathoms wire out, to net.

Field No. F50-21: "Mulberry Seamount," 22.6 miles W. and 14.4 miles S. of Southeast Farallon Island; Ship's log, "Sta. 65"; 37°27'25" N., 123°28'30" W.; 45.8 miles off Pt. Montara; April 6-7; time, 2045-0220; at surface; depth of water, 750 fathoms; temperature, 10.6° C. (51° F.) at 0220; night light and dip-net (serim).

Field No. F50-22: Drakes Bay; Ship's log, "Sta. 66"; 38°00'30" N., 122°58'00" W.; 0.7 mile offshore; April 7; time, 0900-1000; on bottom;

depth of water, 5.5 fathoms; temperature, 10.8° C. (51.5° F.) at 1000; hook and line, prawn and beef bait.

The positions were determined from United States Coast and Geodetic Survey charts 5402 (dated 1941), 5502 (1947), and 5599 (1941).

SPECIMENS COLLECTED

LAMNIDAE—mackerelsharks

Isurus glaucus (Müller and Henle)—bonitoshark.

Oxyrhina glauca Müller and Henle, 1841:69, col. pl.

Cordell Bank, F49-12I, 34 fathoms (1 tooth, CAS 25593).

This record constitutes a northerly extension of the range of this species, which has been recorded by Roedel and Ripley (1950:44) as occurring "from Monterey Bay south."

SCYLIORHINIDAE—catsharks

Apristurus brunneus (Gilbert)—brown catshark.

Cordell Bank vicinity, F49-17, 68 fathoms (1 egg-case, CAS 25610).

The identification of this specimen is based upon the description published by DeLacy and Chapman (1935:64).

CARCHARHINIDAE—graysharks

Prionace glauca (Linnaeus)—blueshark.

Cordell Bank, F49-12I, 34 fathoms (1 apical fragment of tooth-crown, CAS 25594).

Galeorhinus zyopterus Jordan and Gilbert—soupfin.

Cordell Bank, F49-12I, 34 fathoms (1 tooth, CAS 25595).

RAJIDAE—skates

Raja trachura Gilbert—rougetail skate.

"Mulberry Seamount," F50-A1, 1000 to 700 fathoms (1 male embryo, TL 185 mm., and its egg-case, extreme length 210 mm.; CAS 25617).

To the naked eye, the egg-case (pl. 21, fig. 1) appears longitudinally striate. Under low magnification, each of the striae is seen to bear a dense series of translucent brownish villi, which render the surface of the egg-case plushlike to the touch.

The dorsal surface of the embryo (pl. 21, fig. 2) is covered with embedded spinules, which tend to form longitudinal rows, and which become more closely approximated along the upper sides of the tail. None of these spinules is enlarged in the region of the orbital rims or in the middle of the back. From a point nearly opposite the posterior attachment of the pectoral fins, a dorsal series of 27 enlarged but embedded spines extends along the midline of the tail to the origin of the first dorsal fin. The first dorsal fin bears 4 spinules on its left side and 7 on its right; the second dorsal bears 4 on the left side and 3 on the right.

The anterior pelvic lobe is fleshy, subterete proximally (its tip vertically compressed), and is somewhat remote from the posterior lobe, but does not arise from the ventral surface of the disc independently of the posterior lobe as in *Cruriraja* Bigelow and Schroeder (1948: 549).

A full description of this embryo and egg-case is being prepared by Hubbs and Follett. The species has previously been recorded only from off Pt. Loma, California (Gilbert, 1892: 539), from south of Santa Rosa Island, California (Townsend and Nichols, 1925: 6), and from south of Shumagin Islands, Alaska (Gilbert, 1895: 398).

? *Raja stellulata* Jordan and Gilbert—starry skate.

Fanny Shoal vicinity, F49-20, ca. 400 fathoms (3 egg-cases, CAS 25616).

These egg-cases do not exactly resemble those of any of the species of *Raja* heretofore recorded from California. They are characterized by the moderate size and by the rather sharp even ridges that are not disrupted into nodules. Since the egg-cases of other California species have been recognized, it is assumed that these specimens may represent *Raja stellulata*, not of most authors but rather the species described by Gilbert (1915: 307, pl. 14, fig. 1) as *Raja montereyensis*. Species of skates along the Pacific coast of the United States are under investigation by Hubbs and Follett.

CHIMAERIDAE—chimaeras

Hydrolagus colliei (Lay and Bennett)—ratfish.

Cordell Bank, F49-12D, 57 to 50 fathoms (1 egg-case, CAS 25581).
Cordell Bank vicinity: F49-17, 68 fathoms (1 egg-case, CAS 25611);
F49-18, 62 fathoms (3 egg-cases, CAS 25613); F50-8, 400 to 200 fathoms
(1 egg-case, CAS 25637).

ENGRAULIDIDAE—anchovies

Engraulis mordax mordax Girard—ocean northern anchovy.

Cordell Bank, F49-12III, surface (1 postlarva, SL 33 mm., CAS 25591).

OSMERIDAE—smelts**Hypomesus pretiosus** (Girard)—surf smelt.

Southeast Farallon Island vicinity, F50-A7, 44 to 33 fathoms (30 postlarvae, SL 12 to 34 mm., CAS 25634).

These specimens of a surf-spawning species were brought up with a number of erinoids, and may have been captured when the dredge was near the surface, although it would seem more probable that they were taken in deep water. Clemens and Wilby (1946:99) noted that "The young disappear after hatching and may return in the first, second or third year."

In a 31-mm. specimen of this series the scales have not yet appeared, and the myomeres (about 67) are conspicuous. There are 2 large melanophores on the upper third of the operculum, and a series of about 33 on each side of the midline of the ventral surface (pl. 22).

BATHYLAGIDAE—blacksmelts**Leuroglossus stilbius** Gilbert—(California) smoothtongue.

Off Waddell Creek, F50-1B, 300 fathoms wire out (1 adult, SL 69 mm., CAS 25622); Cordell Bank vicinity, F50-14, 580 fathoms wire out (1 half-grown, SL 40 mm., CAS 25653).

Bathylagus alascanus Chapman—Alaska blacksmelt.

Bathylagus alascanus Chapman, 1939:505, fig. 58.

Fanny Shoal vicinity, F50-16, 900 fathoms wire out (1 half-grown, SL 78 mm., CAS 25663).

Bathylagus wesethi Bolin—southern blacksmelt.

Bathylagus wesethi Bolin, 1938:66, fig. 23.

Fanny Shoal vicinity, F50-16, 900 fathoms wire out (2 large young, SL 28 and 31 mm., CAS 25664).

These specimens have been compared with the holotype and a paratype of *B. wesethi* and have been found identical. The dorsal- and anal-ray counts are 12-13 and 15, respectively (all rays counted). There are several longitudinal rows of large melanophores in clear areas along the midsides, and the mouth and the opercular and visceral regions are blackish.

STERNOPTYCHIDAE—lightfishes**Cyclothone signata** Garman—showy bristlemouth.

Cordell Bank vicinity: F50-10, 550 fathoms wire out (4 half-grown, SL 21 to 30 mm., CAS 25640); F50-14, 580 fathoms wire out (2 half-grown,

SL 29 mm., CAS 25656). Fanny Shoal vicinity: F50-15, 1500 fathoms wire out (1 half-grown, SL 24 mm., CAS 25661); F50-16, 900 fathoms wire out (1 half-grown, SL 32 mm., CAS 25666); Southeast Farallon Island vicinity, F50-20, 1800 fathoms wire out (2 half-grown, SL 24 and 25 mm., in poor condition; identification uncertain; CAS 25674).

Cyclothone acclinidens Garman—benttooth bristlemouth.

Cordell Bank vicinity, F50-14, 580 fathoms wire out (2 half-grown, SL 22 and 32 mm., CAS 25655); Fanny Shoal vicinity, F50-16, 900 fathoms wire out (2, half-grown and adult, SL ca. 33 and 51 mm., CAS 25665); Southeast Farallon Island vicinity, F50-19, 1200 fathoms wire out (1 adult, SL 50 mm., CAS 25673).

Cyclothone pallida Brauer—bicolored bristlemouth.

Cyclothone pallida Brauer, 1902:281.

Cordell Bank vicinity: F50-10, 550 fathoms wire out (1 half-grown, SL ca. 38 mm., CAS 25641); F50-14, 580 fathoms wire out (5 half-grown to adult, SL 36 to 44 mm., CAS 25654).

Sternoptyx obscura Garman—dusky hatchetfish.

Fanny Shoal vicinity, F50-16, 900 fathoms wire out (1 small adult, SL 36 mm., CAS 25667).

MELANOSTOMIATIDAE—scaleless dragonfishes

Tactostoma macropus Bolin—longfin dragonfish.

Tactostoma macropus Bolin, 1939a:39, fig. 1.

Cordell Bank vicinity, F50-14, 580 fathoms wire out (1 adult, SL 168 mm., CAS 25657).

D 15; A 22; P₂ 10—10; C 10 + 9. Gill-rakers ca. 18 + 32—13 + 34; the upper consisting of 3 remote pairs, with scarcely perceptible rudiments irregularly disposed in the interspaces; the lower arranged predominantly in groups of 2, 3, or 4 teeth that diverge slightly from each other and vary irregularly in size, the longest approximately 0.3 mm. in height.

An irregularly oval cream-white interorbital luminous area, 0.8 mm. long and 0.5 mm. wide, lies opposite the anterior margin of the orbits. A subhorizontal luminous area at the anteroventral margin of the orbit is 1.3 mm. long and 0.1 mm. wide, with a downward curve at the middle. A subvertical luminous area at the anterior margin of the orbit is 0.5 mm. long on the left

side of the head, 0.7 mm. long on the right, and 0.1 mm. wide, and is slightly crescentic, with the ends directed backward. These two light organs along the front of the eye are watery gray. The suborbital organ is silvery with a yellow tinge. Two days after this specimen was captured and preserved in formalin, its photophores were cerise.

Bolin (1939a: 40) noted that the barbel of the 71-mm. holotype may have been broken. Chapman (1939: 516, 518), in his original description of *Photoclops multipunctata* (currently regarded as a synonym of this species; cf. Clemens and Wilby, 1946: 110), expressed the same doubt as to the barbel of his 280-mm. holotype, but stated of his 99-mm. paratype that its barbel "is 4 mm. long . . . tapers to a fine point . . . and does not appear to have been broken." (*op. cit.*: 519). The barbel of the present specimen is 2 mm. in length. It is evenly rounded at its tip, and apparently unbroken. An X-ray shows 62 vertebrae in front of the anal fin.

CHAULIODONTIDAE—viperfishes

Chauliodus macouni Bean—(Pacific) viperfish.

Cordell Bank vicinity, F50-10, 550 fathoms wire out (1 postlarva, SL ca. 40 mm., CAS 25642).

SCOMBERESOCIDAE—sauries

Cololabis saira (Brevoort)—(Pacific) saury.

Scomberesox saira Brevoort, 1856:281 (misprinted "*Scomberesox*" in heading), col. pl. 7, fig. 4.

Cordell Bank, surface: F49-12FF (3 young to adult, SL 44 to 268 mm., CAS 25586); F49-12HH (31 young, SL 45 to 89 mm., CAS 25592); F49-13 (50 young, SL 37 to 78 mm., CAS 25597); F49-15 (127 young, SL 47 to 83 mm., CAS 25604). North Farallon Island vicinity, F49-12JJ, surface (few, discarded). Off Waddell Creek, F50-1BB, surface (1 adult, SL 237 mm., CAS 25629).

The remote possibility that *Cololabis adocetus* Böhlke (1951: 83) might be represented in these series was eliminated by the following counts of the pectoral rays of each of the 212 catalogued specimens: 13—13 (124), 14—14 (23), 12—12 (20), 12—13 (12), 13—14 (12), 14—13 (9), 13—12 (8), 14—12 (1), 7—14 (1), 13—? (1), ?—13 (1).

MYCTOPHIDAE—lanternfishes

Tarletonbeania crenularis (Jordan and Gilbert)—blue lanternfish.

Guide Seamount, F50-1AA, surface (18 half-grown, SL 21 to 28 mm., CAS 25621); off Waddell Creek, F50-1B, 300 fathoms wire out (4 half-

grown, SL 23 to 45 mm., CAS 25623); Cordell Bank vicinity, F50-13, 450 fathoms wire out (1 half-grown, SL 41 mm., CAS 25650); "Mulberry Seamount," F50-21, surface (81 half-grown to adult, SL 24 to 67 mm., CAS 25676).

A 42-mm. male of CAS 25676 bears 2 Pre on the right side, the posterior about $\frac{3}{4}$ the diameter of the anterior. They are separated by a space equal to about $\frac{1}{3}$ of the diameter of the anterior organ. The single Pre of the left side is situated about $\frac{1}{4}$ its own diameter farther back than the anterior of the right-hand pair, which it equals in size.

Toward the end of the period during which the specimens of series F50-21 were being collected, a pair of Alaska fur seals (*Callorhinus ursinus*) were observed foraging under the night light, frequently within 10 feet of the ship. They appeared to be feeding upon fish of this species, which constituted 81 of the 85 specimens collected. One of the pair was struck over the back with the long-handled dip-net, after which it remained at a slightly greater distance while the other seal continued its activities as before. Later a Dall porpoise (*Phocoenoides dalli*) foraged briefly within the illuminated area, apparently seeking these fish. The number of fish observed thereupon decreased to such an extent that collecting was discontinued for the night.

Myctophum californiense Eigenmann and Eigenmann—California lanternfish.

"Mulberry Seamount," F50-21, surface (1 adult male, SL 80 mm., CAS 25677).

An X-ray shows 39 vertebrae. Bolin (1939B:107) recorded a male specimen, SL 52.4 mm., with 3 supracaudal luminous glands. The present specimen bears 5 supracaudal luminous glands, the first originating above the interspace between ΔOp_5 and ΔOp_6 , the fifth extending to a point above ΔOp_6 (the last of the ΔOp series). On the left side of the fish, SAO_2 is slightly behind VO_4 , although Bolin stated that in his material SAO_2 is directly over or slightly in advance of VO_4 .

Diaphus theta Eigenmann and Eigenmann—(California) headlightfish.

Guide Seamount, F50-1A, 300 fathoms wire out (1 adult, SL 49 mm., CAS 25618). Off Waddell Creek, F50-1B, 300 fathoms wire out (5 half-grown, SL 21 to 30 mm., CAS 25624). Cordell Bank vicinity: F50-9, 400 fathoms wire out (1 half-grown, SL ca. 36 mm., in poor condition; identification uncertain; CAS 25638); F50-13, 450 fathoms wire out (4 adults, SL 46 to 51 mm., CAS 25651); F50-14, 580 fathoms wire out (1 adult, SL 44 mm., CAS 25658).

Lampanyctus leucopsarus (Eigenmann and Eigenmann)—northern lampfish.

Guide Seamount, F50-1A, 300 fathoms wire out (3 half-grown to small adult, SL 32 to 53 mm., CAS 25619). Off Waddell Creek, F50-1B, 300 fathoms wire out (18 half-grown to small adult, SL 29 to 58 mm., CAS 25626). Cordell Bank vicinity: F50-10, 550 fathoms wire out (1 adult, SL 63 mm., in poor condition; identification uncertain; CAS 25644); F50-13, 450 fathoms wire out (5 large young to half-grown, SL 23 to 38 mm., CAS 25652). Fanny Shoal vicinity, F50-16, 900 fathoms wire out (2 adults, SL 66 and 68 mm., CAS 25668). Southeast Farallon Island vicinity, F50-20, 1800 fathoms wire out (1 small adult, SL 41 mm., CAS 25675).

Lampanyctus ritteri Gilbert—broadfin lampfish.

Off Waddell Creek, F50-1B, 300 fathoms wire out (1 half-grown, SL 47 mm., CAS 25625).

Lampanyctus regalis (Gilbert)—pinpoint lampfish.

Fanny Shoal vicinity, F50-15, 1500 fathoms wire out (2 adults, SL 66 and 102 mm., CAS 25662).

In the larger specimen the last (7th) AOa on each side is markedly elevated, onto the next seale-row above the preceding AOa, so that one could enumerate 3 Pol. The smaller one has 6 AOa on its left side, 7 on the right, with the last organ not elevated.

This record is not regarded as a northerly extension of the range, because of the fact that Fraser-Brunner (1949:1085) synonymized *Lampanyctus micropunctatus* Chapman (from British Columbia and Alaska) with this species.

SCOPELARCHIDAE—pearl-eyes

Neoscopelarchoides dentatus Chapman—northern pearl-eye.

Neoscopelarchoides dentatus Chapman, 1939:530, fig. 67.

Cordell Bank vicinity, F50-10, 550 fathoms wire out (1 young, SL 42 mm., CAS 25643).

This record represents a southerly extension of some 900 miles from the southernmost locality (off Cape Scott, Vancouver Island) mentioned in the original description. The identification was made by Elbert H. Ahlstrom, of the U. S. Fish and Wildlife Service, who has taken larvae of the species off central California.

MERLUCCIIDAE—hakes**Merluccius productus** (Ayres)—(Pacific) hake.

Fanny Shoal vicinity, F50-A15, 1000 fathoms (1 precaudal vertebra, CAS 25660).

The identification of this specimen is based upon a comparison with the photograph published by Radcliffe (1913: pl. 15) and with skeletal material of *M. productus*.

BOTHIDAE—lefthanded flounders**Citharichthys sordidus** (Girard)—Pacific saundab.

Cordell Bank, F49-12D, 57 to 50 fathoms (2, large young and half-grown, SL 109 and 133 mm., CAS 25582). North Farallon Island vicinity, F49-12J, 42 fathoms (15 small adult to adult, SL 180 to 272 mm., CAS 25596; many others discarded).

PLEURONECTIDAE—righthanded flounders**Psettichthys melanostictus** Girard—sand flounder; market name, sand sole.

Drakes Bay, F50-7, 4.5 fathoms (1 small adult female, SL 278 mm., discarded).

Lepidopsetta bilineata (Ayres)—gravel flounder; market name, broadfin sole.

Platessa bilineata Ayres, 1855: [2].

Drakes Bay, F50-7, 4.5 fathoms (1 small adult male, SL 260 mm., discarded).

Microstomus pacificus (Lockington)—slippery flounder; market name, Dover sole.

Guide Seamount, F50-1A, 300 fathoms wire out (1 postlarva, SL 26 mm., CAS 25620).

It has been indicated by Jordan and Evermann (1898b: 2655), by Jordan, Evermann, and Clark (1930: 228), by Norman (1934: 360), and by Schultz and DeLaey (1936: 69) that the original description of this species is contained in the report upon the food fishes of San Francisco, by Lockington (1879e: 43). However, that paper expressly states that this species “. . . has been described as *Glyptocephalus pacificus* in the Proceedings of the National Museum, September, 1879, p. 86.” This description by Lockington (1879b: 86) is actually included in the “signature” dated July 2, 1879. The

document containing the report on the food fishes of San Francisco carries items (pp. 60, 61) dated November 1, 1879, and was apparently published late in 1879 or early in 1880. The publication containing the original description (Lockington, 1879a: 254) is dated April 19, 1879.

Platichthys stellatus rugosus Girard—(southern) starry flounder.

Drakes Bay: F50-7, 4.5 fathoms (8 small adults, SL 250 to 426 mm., discarded); F50-22, 5.5 fathoms (1 small adult, SL 245 mm., CAS 25680; 6 other small adults, SL 260 to 319 mm., discarded).

CARANGIDAE—jacks

Trachurus symmetricus (Ayres)—(Pacific) jackmackerel.

Cordell Bank, F49-15, surface (1 young, SL 56 mm., CAS 25605).

SCORPAENIDAE—rockfishes; market name, rock cod

In all vertebral counts of *Sebastes* species included in this paper, the first vertebra with a well-developed haemal spine is regarded as the first caudal vertebra. In the several species noted, 10 vertebrae are considered precaudals, as they bear transverse processes and ribs and overlie the body cavity. The fact that several have transverse processes arching under the dorsal aorta does not appear to discount them as precaudals. The 11th vertebra is counted as the first caudal, because it is abruptly longer than the 10th, and much more united bilaterally, and because it lies at the end of the body cavity and supports the first (much enlarged) interhaemal spine. These characters would seem to establish the 11th as a caudal vertebra even though the tip of its haemal spine is bifurcate (to receive the enlarged interhaemal). The two divisions obviously grade together, but the sharpest break lies between the 10th and the 11th vertebrae. All counts here given include the hypural. I am indebted to Carl L. Hubbs for this elucidation of the vertebral characters of *Sebastes*.

Gill-raker counts of *Sebastes paucispinis*, *S. flavidus*, *S. miniatus*, and *S. ruberrimus*, made principally from arches excised from discarded specimens, show rather sharp differences between these species (table 1).

Sebastes paucispinis (Ayres)—boceacio.

Sebastes paucispinis Ayres, 1854c:178.

Cordell Bank: F49-12E, 34 fathoms (1 adult, SL 540 mm., CAS 25583); F49-12F, 35 fathoms (5 adults, SL 435 to 505 mm., discarded); F49-12H, 28 fathoms (1 adult, SL 605 mm., CAS 25588; 4 others, SL 410 to 510 mm., discarded); F49-14, 34 fathoms (2 small adult males, SL 357 and 400 mm.,

weight 3 and 4 pounds, discarded); F49-19, 28 fathoms (2 adults, male and female, SL 475 and 492 mm., weight 6 pounds, discarded). Cordell Bank vicinity: F50-11, 30 fathoms (6 adults, SL 410 to 560 mm., discarded); F50-12, 30 fathoms (6 adults, SL 406 to 557 mm., discarded).

Counts on 19 discarded specimens: GRa (upper) 8 (16), 9 (3); GRa (lower) 20 (5), 21 (11), 22 (3); GRa (total) 28 (5), 29 (10), 30 (2), 31 (2); GRp (upper) 5 (2), 6 (16), 7 (1); GRp (lower) 13 (4), 14 (8), 15 (7); GRp (total) 19 (4), 20 (9), 21 (6).

The vertebrae number $10 + 16 = 26$ in both specimens of F49-19. Jordan (1921:491) stated that this species has but 25 vertebrae (including the hypural). Clothier (1951:67), however, recorded a total count of 26 vertebrae in one or more specimens, presumably taken in southern California.

Sebastes serranoides Eigenmann and Eigenmann—bass rockfish.

Cordell Bank, F49-14, 34 fathoms (1 adult, SL 390 mm., CAS 25598); Cordell Bank vicinity, F50-11, 30 fathoms (1 adult, SL 385 mm., CAS 25645; another, SL 405 mm., discarded).

Counts on CAS 25598: GRa 8 + 23—9 + 24. The light blotches on the back were prominent in life; the anal and caudal fins brown.

These records constitute a slight northerly extension of range for this species, which has been recorded by Hubbs and Schultz (1933:21) as occurring from "San Francisco to Lower California."

Sebastes flavidus Ayres—yellowtail rockfish.

Cordell Bank: F49-12E, 34 fathoms (1 adult, SL 334 mm., CAS 25584; 9 other adults, SL 350 to 425 mm., discarded); F49-12F, 35 fathoms (14 adults, SL 335 to 410 mm., discarded); F49-12H, 28 fathoms (2 adults, SL 360 and 410 mm., CAS 25589; 8 others, SL 340 to 400 mm., discarded); F49-14, 34 fathoms (1 adult, SL 393 mm., CAS 25599; 10 other adults, all females, SL 345 to 400 mm., weight 4 to 6 pounds, discarded); F49-16, 40 fathoms (2 adults, SL 370 and 390 mm., CAS 25606; skull and facial bones of larger specimen; smaller specimen entire; a number of other adults discarded); F49-19, 28 fathoms (5 adults, 1 male, 4 females, SL 310 to 382 mm., weight 2 to 5 pounds, discarded); F50-11, 30 fathoms (5 adults, SL 344 to 367 mm., discarded); F50-12, 30 fathoms (7 adults, SL 307 to 396 mm., discarded).

Counts on 53 discarded specimens: GRa (upper) 9 (4), 10 (23), 11 (23), 12 (3); GRa (lower) 23 (1), 24 (7), 25 (12), 26 (24), 27 (9); GRa (total) 33 (2), 34 (7), 35 (8), 36 (13), 37 (14), 38 (8), 39 (1); GRp (upper) 5 (8), 6 (39), 7 (6); GRp (lower) 18 (2), 19 (6), 20 (19), 21 (22), 22 (4); GRp (total) 24 (4), 25 (7), 26 (16), 27 (20), 28 (5), 29 (1).

Several specimens were conspicuously blotched with black except on the ventral surface. The stomachs of 9 contained few to many glassy tunicates.

Counts on CAS 25606, larger specimen: P₁ i, 8, ix (= 18)—i, 8, ix (= 18); GRa 10 + 25—11 + 25. The vertebrae number 10 + 16 = 26 in 5 specimens (F49-19). Clothier (1951: 67) recorded a total count of 26 vertebrae in one or more specimens, presumably taken in southern California.

Sebastodes pinniger (Gill)—orange rockfish.

Cordell Bank: F49-16, 40 fathoms (2 adults, SL 355 and 395 mm., CAS 25607); F49-19, 28 fathoms (1 adult, SL 345 mm., CAS 25614).

Sebastodes miniatus (Jordan and Gilbert)—vermilion rockfish.

Cordell Bank: F49-12E, 34 fathoms (1 adult, SL 420 mm., CAS 25585); F49-14, 34 fathoms (2 adults, SL 402 and 470 mm., CAS 25600; skull and facial bones of smaller specimen; larger specimen entire; 5 other adults, 4 males, 1 female, SL 365 to 443 mm., weight 4 to 8 pounds, discarded); F49-16, 40 fathoms (1 adult, discarded); F49-19, 28 fathoms (4 adults, 2 males, 2 females, SL 345 to 445 mm., weight 4 to 8 pounds, discarded).

Counts on 16 discarded specimens: GRa (upper) 10 (1), 11 (1), 12 (12), 13 (2); GRa (lower) 25 (6), 26 (8), 27 (2); GRa (total) 36 (2), 37 (5), 38 (6), 39 (2), 40 (1); GRp (upper) 6 (2), 7 (9), 8 (5); GRp (lower) 20 (3), 21 (9), 22 (4); GRp (total) 27 (3), 28 (7), 29 (5), 30 (1).

Counts on CAS 25600, smaller specimen (male, weight 6 pounds): P₁ i, 8, ix (= 18)—i, 8, ix (= 18); GRa 11 + 24—11 + 24. The vertebrae number 10 + 16 = 26 in 4 specimens (F49-19). Jordan (1921: 491) stated that "*R[osicola] miniatus*" has but 25 vertebrae (including the hypural). Clothier (1951: 67), however, recorded a total count of 26 vertebrae in one or more specimens, presumably taken in southern California.

Sebastodes ovalis Ayres—widow rockfish.

Cordell Bank, F49-16, 40 fathoms (1 adult, SL 360 mm., CAS 25608; another, discarded).

? **Sebastodes wilsoni** Gilbert—little rockfish.

Cordell Bank vicinity, F49-17, 68 fathoms (1 young, SL 53 mm., CAS 25612). Cordell Bank, F49-19, 28 fathoms (4 young, SL 25 to 40 mm.; 2 of these from the stomach of a 417-mm. *Sebastodes miniatus*, 1 from the stomach of a 394-mm. *Sebastodes miniatus*, and 1 from the stomach of a 302-mm. *Sebastodes ruberrimus*; CAS 25615).

These small specimens are in relatively poor condition, and their identification is somewhat doubtful, although corroborated by the following gill-

raker counts: 11 + 30—11 + 30; 10 + 30—(?) ; 11 + 30—(?) ; 12 + 31—11 + 31; 10 + 31—11 + 32.

Sebastes wilsoni has been recorded from Oregon by Hubbs (1928: 13) and from British Columbia by Hubbs and Schultz (1932: 323) and by Clemens and Wilby (1946: 214).

Sebastes rosaceus (Girard)—rosy rockfish.

Cordell Bank: F49-12II, 28 fathoms (2 adults, SL 170 and 207 mm., CAS 25590); F49-14, 34 fathoms (1 adult, SL 203 mm., CAS 25601). Cordell Bank vicinity: F50-11, 30 fathoms (4 adults, SL 181 to 205 mm., CAS 25646; 11 others, SL 173 to 238 mm., discarded); F50-12, 30 fathoms (1 adult, SL 203 mm., CAS 25648, skeletonized; 5 others, SL 191 to 218 mm., discarded).

Counts on CAS 25648: P₁ ii, 7, viii (= 17)—ii, 7, viii (= 17); GRa 10 + 22—10 + 22; vertebrae 10 + 16 = 26.

Clothier (1951: 67) recorded a total count of 26 vertebrae in one or more specimens of this species, and a total count of 27 in another specimen. Presumably these were taken in southern California. The latter record constitutes the first evidence which I have found that tends to corroborate the statement by Jordan (1921: 491) that he counted 27 vertebrae in certain species (not mentioned by name) of *Sebastes*. It may be noted further that Jordan and Evermann (1898a: 1766) included "Vertebrae 12 + 15" among the generic characters.

Sebastes constellatus (Jordan and Gilbert)—starry rockfish.

Cordell Bank: F49-14, 34 fathoms (1 adult, SL 310 mm., CAS 25602); F49-16, 40 fathoms (1 adult, SL 310 mm., CAS 25609; 2 others, discarded); F49-19, 28 fathoms (1 adult female, SL 305 mm., weight 2 pounds, discarded). Cordell Bank vicinity: F50-11, 30 fathoms (1 adult, SL 300 mm., discarded); F50-12, 30 fathoms (1 adult, SL 330 mm., skeletonized; CAS 25649).

Counts on 2 discarded specimens: GRa (upper) 9 (2); GRa (lower) 19 (1), 20 (1); GRa (total) 28 (1), 29 (1); GRp (upper) 4 (2); GRp (lower) 15 (2); GRp (total) 19 (2).

Counts from F49-19: P₁ i, 8, ix (= 18)—i, 8, ix (= 18); vertebrae 10 + 16 = 26. CAS 25649: P₁ ii, 7, viii (= 17)—i, 8, viii (= 17); GRa 8 + 19—7 + 19, the 2nd and 3rd lowest fused; vertebrae 10 + 16 = 26.

Sebastes ruberrimus Cramer—red rockfish.

Cordell Bank: F49-14, 34 fathoms (2 adults, SL 380 and 472 mm., CAS 25603; 2 other adults, SL 425 and 480 mm., discarded); F49-19.

28 fathoms (1 small adult female, SL 302 mm., discarded). Cordell Bank vicinity: F50-11, 30 fathoms (3 adults, SL 415 to 490 mm., discarded); F50-12, 30 fathoms (8 adults, SL 357 to 450 mm., discarded).

Counts on 9 discarded specimens: GRa (upper) 8 (6), 9 (3); GRa (lower) 17 (2), 18 (4), 19 (2), 20 (1); GRa (total) 25 (2), 26 (3), 27 (1), 28 (3); GRp (upper) 4 (1), 5 (8); GRp (lower) 14 (5), 15 (4); GRp (total) 19 (6), 20 (3).

Counts on single specimens: P_1 i, 9, ix (= 19)—i, 9, ix (= 19); GRa 8 + 20—8 + 20, the lowest 4 rudimentary, fused, and barely distinguishable; vertebrae 10 + 16 = 26.

Sebastodes maliger (Jordan and Gilbert)—quillback rockfish.

North Farallon Island vicinity, F50-18, 25 fathoms (1 adult, SL 333 mm., CAS 25671).

Sebastodes nebulosus (Ayres)—China rockfish.

Sebastes nebulosus Ayres, 1854c:178.

North Farallon Island vicinity, F50-17, 25 fathoms (2 adults, SL 303 and 325 mm., CAS 25669).

Counts on smaller specimen: P_1 i, 7, x (= 18)—i, 7, ix (= 17); GRa 8 + 19—7 + 20, the lowest 2 fused; vertebrae 10 + 16 = 26.

TABLE 1

Sebastodes gill-raker counts

The figures are taken from those listed in the body of the text. All rudimentary rakers are included in the count. A raker that straddles the angle of the arch is included in the count of the lower limb. The parenthetical figure that follows the name of the species indicates the number of specimens. Figures separated by a hyphen indicate the minimal and maximal counts, respectively, and are followed, in parentheses, by the average.

Anterior row	Upper limb	Lower limb	Total
<i>S. paucispinis</i> (19)	8-9 (8.2)	20-22 (20.9)	28-31 (29.1)
<i>S. flavidus</i> (54)	9-12 (10.5)	23-27 (25.6)	33-39 (36.1)
<i>S. miniatus</i> (17)	10-13 (11.9)	24-27 (25.6)	35-40 (37.5)
<i>S. ruberrimus</i> (10)	8-9 (8.3)	17-20 (18.4)	25-28 (26.7)
Posterior row			
<i>S. paucispinis</i> (19)	5-7 (5.9)	13-15 (14.2)	19-21 (20.1)
<i>S. flavidus</i> (53)	5-7 (6.0)	18-22 (20.4)	24-29 (26.3)
<i>S. miniatus</i> (16)	6-8 (7.2)	20-22 (21.1)	27-30 (28.3)
<i>S. ruberrimus</i> (9)	4-5 (4.9)	14-15 (14.4)	19-20 (19.3)

ANOPILOPOMATIDAE—sablefishes

Anoplopoma fimbria (Pallas)—sablefish.

Gadus fimbria Pallas, 1814:200.

Off Waddell Creek, F50-1B, 300 fathoms wire out (1 postlarva, SL 6 mm., CAS 25627); "Mulberry Seamount," F50-21, surface (1 postlarva, SL 15 mm., CAS 25678).

The black-tipped pectorals of the young of this species, mentioned by Broek (1940:268), are conspicuous in the 15-mm. specimen (pl. 23). Further comments on the young stages of this species have been published by Bell and Gharrett (1945:98).

HEXAGRAMMIDAE—greenlings; market name, sea trout

Hexagrammos decagrammus (Pallas)—kelp greenling; market name, sea trout.

Off Waddell Creek, F50-1B, 300 fathoms wire out (32 postlarvae, SL 10 to 32 mm., CAS 25628); Cordell Bank vicinity, F50-11, 30 fathoms (1 adult male, SL 312 mm., CAS 25647). North Farallon Island vicinity: F50-17, 25 fathoms (2 adults, SL 295 and 360 mm., CAS 25670; larger specimen skeletonized; smaller specimen entire); F50-18, 25 fathoms (1 adult female, SL 355 mm., CAS 25672).

In the largest specimens of CAS 25628, both pairs of dermal appendages are visible under low magnification. The attenuate supraorbital appendage is approximately 3 times as long as the bluntly rounded occipital appendage. Neither shows any trace of fimbriation. Plate 24 indicates the striped coloration of a 25-mm. specimen of CAS 25628.

Counts on CAS 25670, larger specimen: D XXII, 24; A I, 22; P₁ 19-20; C 7 + 8; scales 16-112-34-16-112-34; GRa 4 + 13-4 + 14; BR 6-6; vertebrae 20 + 35 = 55.

From CAS 25672, an unusual color-variant, the following life-colors were noted: Back and sides clear gray, with about 9 longitudinal series of irregular orange spots, these fading to yellow on the lower sides, where the series tend to unite irregularly. Top and sides of head with similar spots; those on the interorbital and occipital regions reduced in size; those on the cheeks tending to form lines radiating from the orbit. Dorsal fins orange, spotted distally and densely blotched basally with gray. Caudal orange. Pectorals, pelvics, and anal yellow. Chin, throat, and ventral surface white.

OPHIODONTIDAE—lingcods

Ophiodon elongatus Girard—lingcod.

North Farallon Island vicinity, F49-12J, 42 fathoms (1 adult female, SL 730 mm., weight 14 pounds, discarded); Cordell Bank, F49-14, 34

fathoms (1 adult, SL 752 mm., TL $337\frac{3}{8}$ inches, weight 20 pounds, discarded); Cordell Bank vicinity, F50-12, 30 fathoms (1 adult, SL 575 mm., discarded).

COTTIDAE—sculpins

Scorpaenichthys marmoratus (Ayres)—cabezon.

Drakes Bay, F50-7A, surface (2 young, SL 31 and 39 mm., CAS 25636).

Bolin (1944: 6) ascribed the name of this species to Girard (1854: 131). This was proper at that time, for it was noted in the Proceedings of the Academy of Natural Sciences of Philadelphia, 7, 1854: 129, that publication of Girard's paper was authorized on August 29, 1854; and separates may have been issued at any time after that date, according to An Index to the Scientific Contents of the Journal and Proceedings of the Academy of Natural Sciences of Philadelphia, 1913: vii. Since Bolin's paper was published, however, the International Commission on Zoological Nomenclature (1950a: 219) has ruled that the distribution of authors' separates does not constitute publication. Other language of the International Commission (1950b: 226) would seem to indicate that this ruling does not apply to successive portions, or "numbers," of a volume. Volume 7, "number" 4, of the Proceedings of the Academy of Natural Sciences of Philadelphia extends from page 121 to page 167, and thus includes Girard's paper. In the Proceedings of the American Philosophical Society, 6, 1854: 47, 49, 50, that "number" is shown to have been received on some date between September 15 and October 6, 1854. This is the earliest record that I have yet encountered. *Hemitripterus marmoratus* Ayres (1854b: 174) was published on September 8, 1854, and must therefore be regarded as the original description of this species.

Hemilepidotus spinosus Ayres—reef Irishlord.

Hemilepidotus (?) *spinosus* Ayres, 1854a: 166.

Cordell Bank vicinity, F50-9, 400 fathoms wire out (1 young, SL 21 mm., CAS 25639): "Mulberry Seamount," F50-21, surface (2 postlarvae, SL 12 and 13 mm., CAS 25679).

In CAS 25639 the free fold of the gill membranes is extremely narrow at its middle. The interorbital is broad and flat, and the vertex is domed both longitudinally and transversely, suggesting the early juvenile characters of *Scorpaenichthys marmoratus*. There is a broad doubled spine at the end of the occiput, and the posttemporal spine is doubled. Each scale bears a single relatively large spinule slightly curved or inclined backward. There are 7 scale rows in the dorsal band near the head, with a trace of another developing along the base of the spinous dorsal. A row of embedded scales,

which are hardly discernible except by their spinules, occurs in front of the caudal base, extends along the base of the anal fin, and joins a patch of similar scales in front of the anus (pl. 25).

The two young specimens of CAS 25679 have a convex interorbital and a strongly domed vertex. There is a longitudinally doubled spine at the end of the occiput. In lateral view, a smaller spine underlies the point of the posttemporal spine. In the smaller specimen the ventral row of spinules is just forming, and also the spinulose patch in front of the anus. The other scales are forming but their development is insufficient to afford a count of the rows (pl. 26). At first I regarded these two young specimens as *Hemilepidotus hemilepidotus*, and the record by Hanna (1951:365) from this locality was based upon my determination. Further study, however, indicates that they are probably *Hemilepidotus spinosus*. Both have been compared with a specimen of *Hemilepidotus hemilepidotus* (CAS 25222), SL 26 mm., and with two specimens of *H. spinosus* (CAS 25221), SL 25 and 28 mm., which I collected May 23, 1947, at Trinidad Head, Humboldt County, California. All three from Trinidad have the row of spinuliferous scales connecting the posterior end of the main scale band with the spinulose patch across the belly in front of the anus, and running near the base of the anal fin and along the caudal peduncle just above its lower edge, but this row is exceedingly inconspicuous in the specimen of *H. hemilepidotus*. Each scale of the principal bands bears 2 relatively minute spinules in the specimen of *H. hemilepidotus* and in the 28-mm. *H. spinosus*. In the 25-mm. specimen the second spinule is just beginning to appear.

AGONIDAE—poachers

Xeneretmus triacanthus (Gilbert)—bluespotted poacher.

Cordell Bank, F49-12G, 124 to 80 fathoms (1 large young, SL 37 mm., CAS 25587).

LIPARIDIDAE—snailfishes

Nectoliparis pelagicus Gilbert and Burke—pelagic snailfish.

Cordell Bank vicinity, F50-14, 580 fathoms wire out (1 adult, SL 48 mm., CAS 25659).

In this specimen there are 7 principal caudal rays, rather than 6 as stated by Gilbert and Burke (1912: 82) or "four or six" as stated by Burke (1930: 190), and there are 5 rays in the lower lobe of the pectoral, rather than 3 or 4. The gill-rakers (0 + 8—0 + 7) are irregularly spaced, short, bifid, their points divergent. In life the distal portion of the caudal rays was vermilion, and there was a vermilion spot on the 2nd caudal ray and on the membrane above and below it, two-thirds of the distance toward its tip, and

a vermilion spot on the distal portion of the membrane between the 5th and 6th caudal rays. The peritoneum appeared externally to be shining white, thickly covered with black dots.

STICHAEIDAE—pricklebacks

Chirolophis nugator (Jordan and Williams)—fuzzyhead prickleback.

Southeast Farallon Island vicinity, F50-A7, 44 to 33 fathoms (2 young, SL 16 and 21 mm., CAS 25635).

I follow Clemens and Wilby (1946:178) in referring this species to the genus *Chirolophis* Swainson.

MOLIDAE—molas

Mola mola (Linnaeus)—common mola; fishermen's name, ocean sunfish.

Cordell Bank vicinity, F49-17 (1 half-grown, TL ca. 2 ft.).

This fish was observed under a crippled murrelet, which was swimming on the surface.

LITERATURE CITED

AYRES, WM. O.

- 1854a. [Descriptions of *Hemilepidotus* (?) *nebulosus* and *Hemilepidotus* (?) *spinosus*.] *The Pacific*, 3 (42), Aug. 25:166.
- 1854b. [Descriptions of *Labrus pulcher* and *Hemitripteras marmoratus*.] *The Pacific*, 3 (44), Sept. 8:174.
- 1854c. [Descriptions of *Sebastes nebulosus* and *Sebastes paucispinis*.] *The Pacific*, 3 (45), Sept. 15:178.
1855. [Description of *Platessa bilineata*.] *The Pacific*, 4 (18), Apr. 6:[2].

BELL, F. HEWARD, and JOHN T. GHARRETT

1945. The Pacific coast blackcod, *Anoplopoma fimbria*. *Copeia*, 1945 (2):94-103, fig. 1.

BIGELOW, HENRY B., and WILLIAM C. SCHROEDER

1948. New genera and species of batoid fishes. *Journal of Marine Research, Bingham Oceanographic Laboratory, Yale University*, 7 (3):543-566, figs. 1-9.

BÖHLKE, J.

1951. A new Pacific saury (genus *Cololabis*) from off the coast of Peru. *Transactions of the Kansas Academy of Science*, 54 (1):83-87.

BOLIN, ROLF L.

1938. *Bathylagus wesethi*, a new argentinid fish from California. *California Fish and Game*, 24 (1):66-68, fig. 23.
- 1939a. A new stomiatoid fish from California. *Copeia*, 1939 (1):39-41, fig. 1.
- 1939b. A review of the myctophid fishes of the Pacific coast of the United States and of Lower California. *Stanford Ichthyological Bulletin*, 1 (4):89-156, figs. 1-29.
1944. A review of the marine cottid fishes of California. *Stanford Ichthyological Bulletin*, 3 (1):1-135, figs. 1-40.

BRAUER, A.

1902. Diagnosen von neuen Tiefseefischen, welche von der Valdivia-Expedition gesammelt sind. *Zoologischer Anzeiger*, 25:277-298.

BREVOORT, JAMES CARSON

1856. Notes on some figures of Japanese fish taken from recent specimens by the artists of the U. S. Japan expedition. *In: Narrative of the expedition of an American squadron to the China seas and Japan, performed in the years 1852, 1853, and 1854, under the command of Commodore M. C. Perry, United States Navy, by order of the government of the United States. U. S. Senate Ex. Doc. No. 79, 33d Congress, 2d Session, 2:1-414, pls., figs., maps (fishes on pp. 253-288, col. pls. 3-12).*

BROCK, VERNON E.

1940. Note on the young of the sablefish, *Anoplopoma fimbria*. *Copeia*, 1940 (4):268-270, fig. 1.

BURKE, VICTOR

1930. Revision of the fishes of the family Liparidae. Bulletin of the United States National Museum, 150:i-xii, 1-204, figs. 1-110.

CHAPMAN, WILBERT McLEOD

1939. Eleven new species and three new genera of oceanic fishes collected by the International Fisheries Commission from the northeastern Pacific. Proceedings of the United States National Museum, 86:501-542, figs. 58-70.

CLEMENS, W. A., and C. V. WILBY

1946. Fishes of the Pacific coast of Canada. Bulletin of the Fisheries Research Board of Canada, 68:1-368, figs. 1-253.

CLOTHIER, CHARLES R.

- [1951].¹ A key to some southern California fishes based on vertebral characters. State of California Division of Fish and Game, Fish Bulletin No. 79, "1950":1-83, pls. 1-23, figs. 1-22.

DELCY, ALLAN C., and WILBERT M. CHAPMAN

1935. Notes on some elasmobranchs of Puget Sound, with descriptions of their egg cases. Copeia, 1935 (2):63-67.

FRASER-BRUNNER, A.

1949. A classification of the fishes of the family Myctophidae. Proceedings of the Zoological Society of London, 118 (4):1019-1106, pl. 1, figs. 1-14, 177 unnumbered figs.

GILBERT, CHARLES H.

1892. Scientific results of explorations by the U. S. Fish Commission steamer Albatross. No. XXII.—Descriptions of thirty-four new species of fishes collected in 1888 and 1889, principally among the Santa Barbara Islands and in the Gulf of California. Proceedings of the United States National Museum, 14, 1891:539-566.
1895. The ichthyological collections of the steamer Albatross during the years 1890 and 1891. Report of the United States Commissioner of Fish and Fisheries for the year ending June 30, 1893. Part 19:393-476, pls. 20-35.
1915. Fishes collected by the United States Fisheries steamer "Albatross" in southern California in 1904. Proceedings of the United States National Museum, 48:305-380, pls. 14-22.

GILBERT, CHARLES H., and CHARLES V. BURKE

1912. Fishes from Bering Sea and Kamchatka. Bulletin of the United States Bureau of Fisheries, 30, 1910:31-96, figs. 1-37.

GIRARD, CHARLES

1854. Descriptions of new fishes, collected by Dr. A. L. Heermann, naturalist attached to the survey of the Pacific Railroad Route, under Lieut.

1. From correspondence with the State of California Division of Fish and Game, and from the date of receipt of the Academy's copy of this bulletin, it appears that although the date "1950" is printed upon the title page and cover, the actual date of publication was May 6, 1951. Square brackets indicate extrinsic evidence of the date, in accordance with a recent recommendation of the International Commission on Zoological Nomenclature (1950b:225-226).

R. S. Williamson, U. S. A. Proceedings of the Academy of Natural Sciences of Philadelphia, 7 (4):129-140.

HANNA, G D.

1951. Alaska fur seals, *Callorhinus ursinus*, observed off San Francisco Bay, California. Journal of Mammalogy, 32 (3):364-365.

HUBBS, CARL L.

1928. A check-list of the marine fishes of Oregon and Washington. Journal of the Pan-Pacific Research Institution, 3 (3), July-September:9-16.
1943. Terminology of early stages of fishes. Copeia, 1943 (4):260.
1945. The record of a fish, *Scorpaena mystes*, from California: a comedy of errors. Copeia, 1945 (3):129-133.

HUBBS, CARL L., and W. I. FOLLETT

- MS. List of the fishes of California.

HUBBS, CARL L., and KARL F. LAGLER

1947. Fishes of the Great Lakes region. Cranbrook Institute of Science, Bloomfield Hills, Michigan, Bulletin 26:i-xi, 1-186, 26 col. pls., figs. 1-251, 1 map.

HUBBS, CARL L., and LEONARD P. SCHULTZ

1932. A new blenny from British Columbia with records of two other fishes new to the region. Contributions to Canadian Biology and Fisheries, n. s., 7 (25):319-324, 1 fig.
1933. Descriptions of two new American species referable to the rockfish genus *Sebastes*, with notes on related species. University of Washington Publications in Biology, 2 (2):15-44, pls. 1-2.

INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE

1943. Declaration 7. On the need for quoting bibliographical or other references for all names cited in zoological works. Opinions and Declarations Rendered by the International Commission on Zoological Nomenclature, 1 (7):49-56.
1950a. Article 25 (meaning of the expression "divulgué dans une publication"). The Bulletin of Zoological Nomenclature, 4 (7/9):215-221.
1950b. Date of publication of a name: method of citation recommended. The Bulletin of Zoological Nomenclature, 4 (7/9):225-226.

JORDAN, DAVID STARR

1921. Latitude and vertebrae. Science, n. s., 54 (1403), Nov. 18:490-491.

JORDAN, DAVID STARR, and BARTON WARREN EVERMANN

1896. The fishes of North and Middle America: a descriptive catalogue of the species of fish-like vertebrates found in the waters of North America, north of the Isthmus of Panama. Part 1. Bulletin of the United States National Museum, 47:i-ix, 1-1240.
1898a. The fishes of North and Middle America . . . Part 2. Bulletin of the United States National Museum, 47:i-xxx, 1241-2183.
1898b. The fishes of North and Middle America . . . Part 3. Bulletin of the United States National Museum, 47:i-xxiv, 2183a-3136.

JORDAN, DAVID STARR, BARTON WARREN EVERMANN, and HOWARD WALTON CLARK

1930. Check list of the fishes and fishlike vertebrates of North and Middle America north of the northern boundary of Venezuela and Colombia. Report of the United States Commissioner of Fisheries for the fiscal year 1928 with appendixes. Part 2. i-iv, 1-670.

LOCKINGTON, W. N.

- 1879a. The flounders of our markets.—No. 2. Mining and Scientific Press, 38 (16), Apr. 19:254.
- 1879b. Review of the Pleuronectidae of San Francisco. Proceedings of the United States National Museum, 2:69-108.
- 1879c. Report upon the food fishes of San Francisco. Report of the Commissioners of Fisheries of the State of California for the years 1878 and 1879:17-58.

MÜLLER, J., and J. HENLE

1841. Systematische Beschreibung der Plagiostomen. Von Veit & Co., Berlin: i-xxii + 4, 1-200, 60 pls.

NORMAN, J. R.

1934. A systematic monograph of the flatfishes (Heterosomata). Vol. 1. Psettodidae, Bothidae, Pleuronectidae. London: i-viii, 1-459, figs. 1-317.

PALLAS, P. S.

- [1814]². Zoographia Rosso-Asiatica, sistens omnium animalium in extenso Imperio Rossico et adjacentibus maribus observatorum recensionem, domicilia, mores et descriptiones, anatonem atque icones plurimorum. Petropoli. 3:i-vii, 1-428, I-CXXV.

RADCLIFFE, LEWIS

1913. Descriptions of seven new genera and thirty-one new species of fishes of the families Brotulidae and Carapidae from the Philippine Islands and the Dutch East Indies. Proceedings of the United States National Museum, 44:135-176, pls. 7-17.

ROEDEL, PHIL M., and WM. ELLIS RIPLEY

1950. California sharks and rays. State of California Division of Fish and Game, Fish Bulletin 75:1-88, figs. 1-65.

SCHULTZ, LEONARD P., and ALLAN C. DELACY

1936. Fishes of the American Northwest. A catalogue of the fishes of Washington and Oregon, with distributional records and a bibliography. Second installment. Mid-Pacific Magazine, 49 (1), January-March: 63-78.

TOWNSEND, CHARLES H., and JOHN T. NICHOLS

1925. Scientific results of the Expedition to the Gulf of California in charge of C. H. Townsend, by the U. S. Fisheries steamship "Albatross," in 1911. Commander G. H. Burrage, U. S. N., commanding. XIV. Deep sea fishes of the "Albatross" Lower California Expedition. Bulletin of the American Museum of Natural History, 52 (1):1-20, pls. 1-4, figs. 1-4, 1 map.

2. Date from The Bulletin of Zoological Nomenclature, 4 (13/15), 1950:403. Extrinsic evidence of the date is indicated by the square brackets, as recommended by the International Commission on Zoological Nomenclature (1950b:225-226).

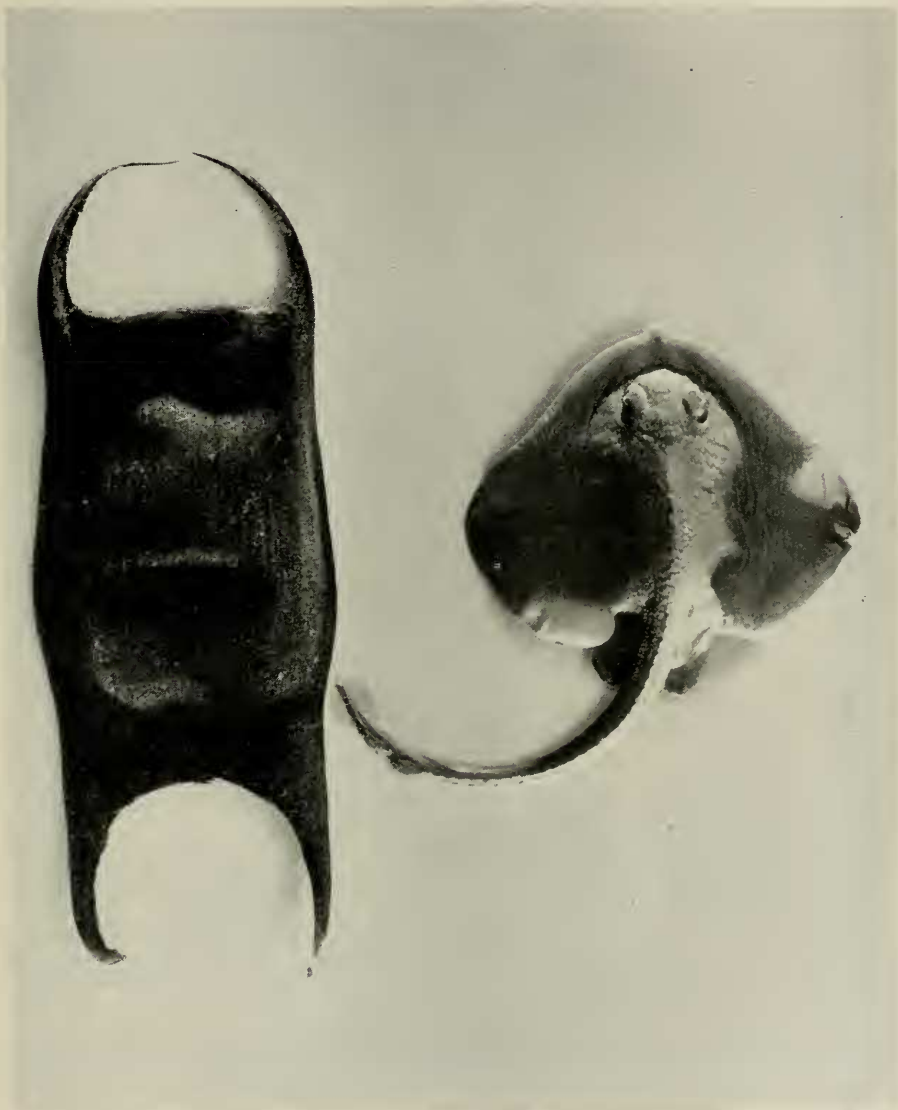
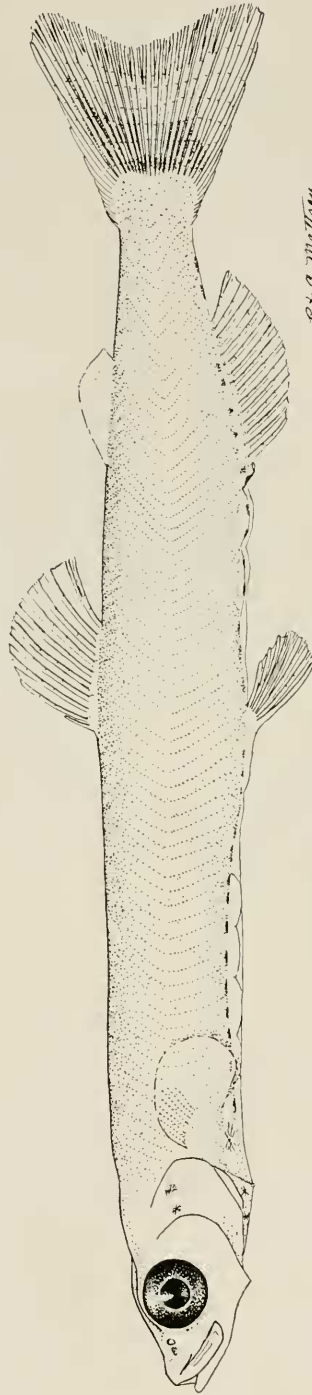
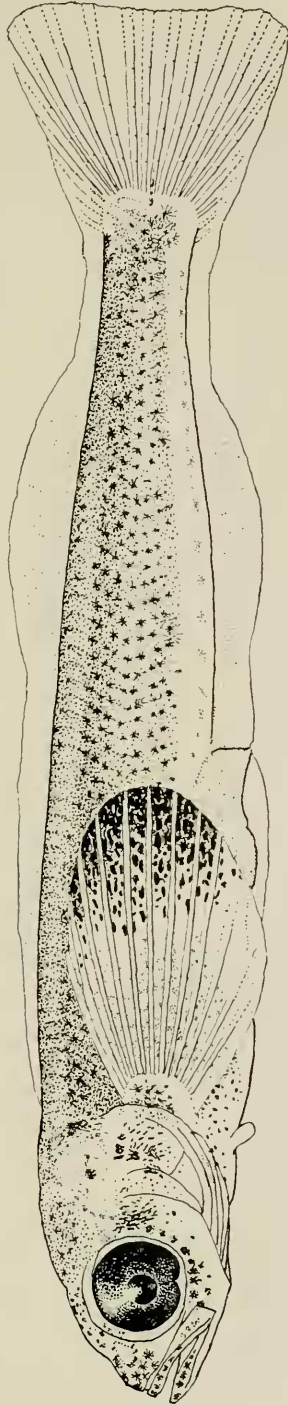


Figure 1. Egg-case of *Raja trachura*, CAS 25617, extreme length 210 mm., from "Mulberry Seamount," in 1,000 to 700 fathoms.

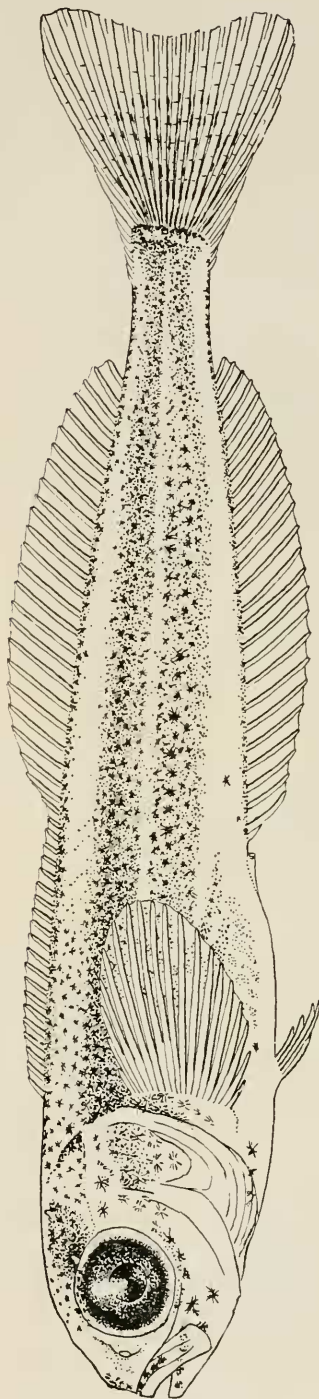
Figure 2. Embryo, CAS 25617, TL 185 mm., removed from the egg-case shown in figure 1.



P. J. Mellen
Postlarva of *Hypomesus pretiosus*, CAS 25634, SL 31 mm., from the vicinity of Southeast Farallon Island, in 44 to 33 fathoms.

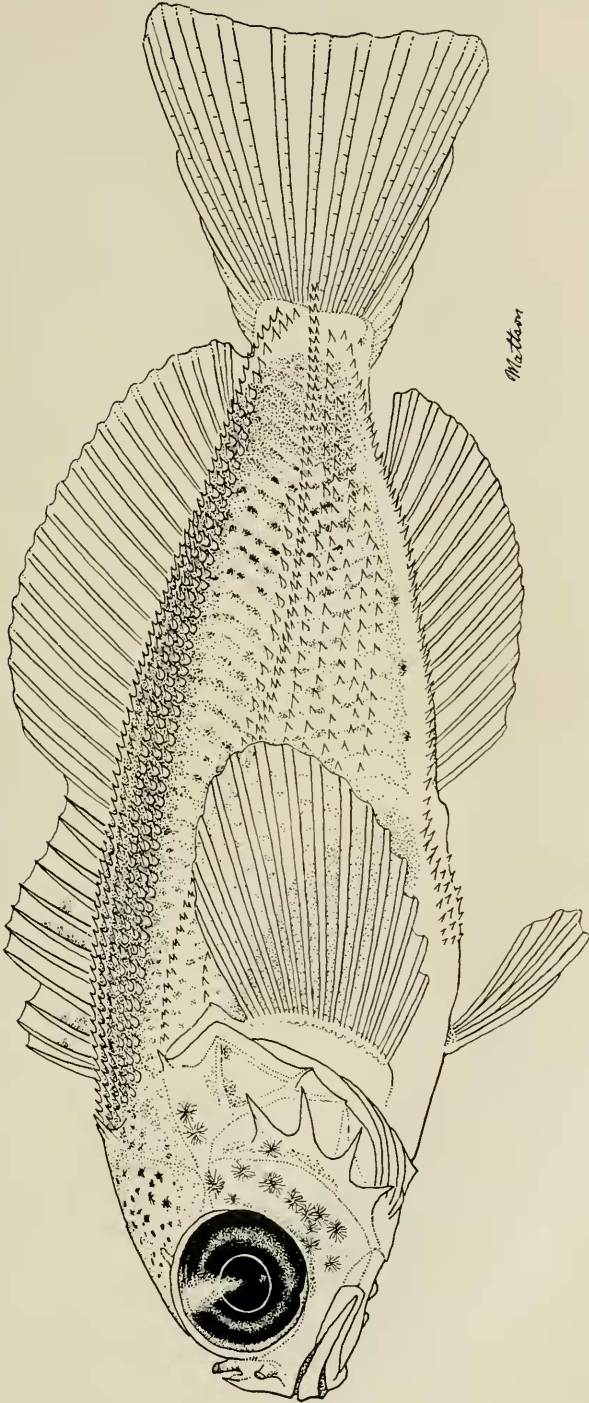


Pop. Muller
Postlarva of *Anoptopoma fimbria*, CAS 25678, SL 15 mm., from "Mulberry Sea-mount," at surface.

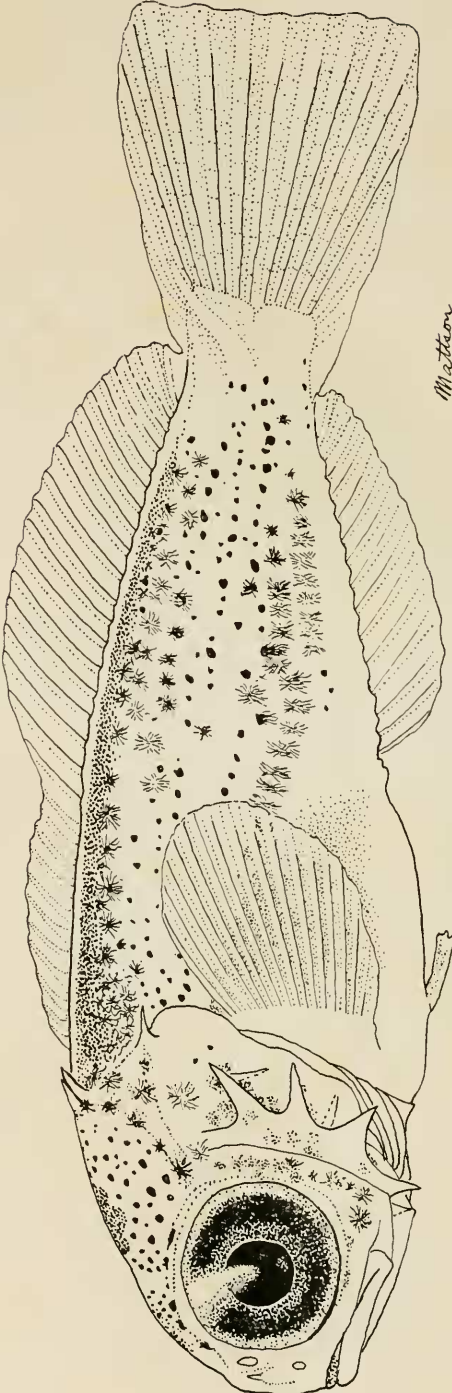


F. J. Mott

Postlarva of *Herogrammos decagrammus*, CAS 25628, SL 25 mm., from off Waddell Creek, with 300 fathoms of wire out.



Young *Hemilepidotus spinosus*, CAS 25639, SL 21 mm., from vicinity of Cordell Bank, with 400 fathoms of wire out.



Postlarva of *Hemilepidotus spinosus* (?), CAS 25679, SL 12 mm., from "Mulberry Seamount," at surface.